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Pathomorphological Differentiation Between Atypical
and Classical Fowl Plague

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PATHOMORPHOLOGICAL DIFFERENTIATION BETWEEN ATYPICAL
AND CLASSICAL FOUL PLAGUE

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Atypical and classical foul plague are two entirely independent diseases which must be fought by different means. For that reason, differential diagnosis of these diseases is of great practical importance. One of the methods of differentiation is pathological-anatomic investigation.

For this purpose, we studied data on chickens from various regions suffering from spontaneous cases of atypical plague, and data obtained from the experimental infection of chickens with a strain of the virus of atypical foul plague isolated at various points of the Soviet Union and abroad (Rumania, Poland, Germany, Denmark).

For comparison, we submitted to pathological-anatomic investigations materials obtained upon experimental infection of chickens with three strains of the virus of the classical European foul plague, a French strain (from Paris), a German strain (from Leestock) and an Austrian strain (from Vienna).

Classical foul plague, according to descriptions of Russian and foreign investigators, is characterized as an acute septic disease with the presence of numerous hemorrhages in various organs, affection of the parenchymatic organs, of the gastro-intestinal tract, and of the central nervous system, and with the development of exudative manifestations with oozing into the subcutaneous tissue and the serous cavities of the organism.

The regular occurrence of exudative manifestations has led several authors to give to the disease the name of exudative typhus.

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According to data in the literature, small point hemorrhages predominantly occur locally in the pericardial region, the serous membranes of the intestine, the serous cavities of the parenchymatic organs, the skeletal muscles, and the mucous membranes of the digestive tract, where they are limited, generally, to the esophagus and the glandular stomach. In the glandular stomach, the hemorrhages occur over the entire surface of the mucous membrane, mostly at the point of transition to the muscular stomach. Some authors regard the kind of hemorrhage in the glandless portion of the mucous membrane at the transition to the muscular stomach as a particularly typical indication.

In data obtained after experimental infection of chickens with the above-mentioned strains of the virus of the classical European fowl plague, we observed single and, most rarely, diffuse hemorrhages. In isolated cases they were absent.

The affection of the glandular stomach is characterized, chiefly by mucous catarrh with strong thickening of the mucous membrane and a profuse exuding of mucus. In isolated cases, the hemorrhages occurred only in the glandless belt of the mucous membrane, at the border of the glandular and the muscular stomach.

Some investigators have noted affection of the intestines, mainly of the upper portion, generally characterized by acute catarrh and rarely the presence of small hemorrhages.

Our investigations of the changes of the intestine, i.e. of its upper portion, also frequently showed the picture of mucous catarrh with infrequent individual hemorrhages, which in the digestive tract were generally limited to the esophagus and the glandular stomach and did not go beyond the limit of the latter.

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In histological investigations of the change of the intestine, we found that the phenomena of desquamative catarrh were usually weakly expressed. The surface structure of the intestine, including the surface epithelial covering, was retained. In the lymphoid tissue of the intestine, only weak hyperplasia of the lymphoid follicles appeared.

In the parenchymatous organs - liver and kidneys - we discovered degenerative changes, and, very rarely, necrotic affection.

In the spleen there was development of multiple foci of cellular hyperplasia in the perivascular lymphocytoid sheath with atresia in their central portions.

We did not establish the widespread pneumonia and fibrinous deposits in the air sacs, serious catarrhal rhinitis, catarrhal and fibrinous tracheitis, and serous-fibrinous pleuritis noted in some rats. In our investigations, the affection of the respiratory tract was limited to rhinitis, catarrhal tracheitis, hyperemia, and edema.

The affection of the nervous system, according to the description given by most authors, is expressed in diffuse non-purulent encephalitis with proliferative reaction of the endothelium, the blood vessels and the glia, accompanied by development of many necrotic foci in the nerve tissue. According to some data, the manifestations of encephalitis were weak, and sometimes absent.

In our investigation, the affection of the brain was characterized chiefly by degenerative changes of the nerve cells, with presence of many cellular necrotic foci and comparatively weak manifestations in the endothelium, the vessels, and the glia. A more or less clear picture of encephalitis can be noted in approximately 30 percent of the cases investigated; in the remaining cases it was extremely weak. Occluded bodies were also not detected.

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This is a short characterization of the morphological changes which occur in fowl plague.

In comparing the pathomorphology of the atypical and the classical fowl pest, we found that the two diseases have a lot in common.

Both variants of the plague have the character of a highly septic disease, most clearly evident in cases of classical plague.

An analogous picture can be observed in some organs - the spleen, the central nervous system, the liver, the kidneys, and parts of the gastro-intestinal tract.

Besides, it should be noted, that in both diseases the vascular system is affected, as manifested by the development of hemorrhages and perivascular foci of necrosis, by general hyperplasia of the lymphohistiocytic tissue, by focal hyperplasia of the spleen with subsequent development of necrosis, and the peculiar picture of cerebritis with numerous foci of necrosis of the brain tissue. But in the background of these common pathological manifestations each disease has its own peculiarities.

Edemas and exudative manifestations, which are regular features of the classical fowl plague, are not observed in atypical plague.

Hemorrhages, which are common to both infections, are distinguished by their localization. In classical fowl plague, they develop preferably along the serous covers of the alimentary tract, in the heart, the skeletal muscles and the parenchymatous organs. In this disease, their occurrence in the alimentary tract is generally limited to the glandular stomach and to the esophagus. They are very rarely found in the intestine.

This agrees with the data of many authors who point out the presence of a hemorrhagic belt at the border between the glandular and the muscular stomach and stress the fact that hemorrhages in the intestine are rare.

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However, in atypical plague, the hemorrhages very regularly occur in the glandular stomach and on the mucous membrane of all portions of the intestine while they are seldom observed in other organs.

Atypical plague is characterized by the presence of fibrinous-necrotic affections of the gastro-intestinal tract. Nobody has ever detected this either in spontaneous or in experimentally induced classical plague. This feature can be considered as a fundamental indication which allows morphological differentiation between the atypical and the classical fowl plague.

Histologically the presence of very serious affection with definite proliferative manifestations, fibrinous-necrotic affection and acute hyperplasia of the lymphadenoidal tissue is characteristic for atypical plague.

In classical fowl plague the affection of the intestine is weaker and generally limited to mucous catarrhs, weakly proliferative manifestations with retention of the general structure of the mucous membrane, weakly expressed hyperplasia of the lymphadenoidal tissue with absence of fibrinous-necrotic processes.

The changes in the spleen, according to our investigations, are in general of a very similar nature, manifested in the development of multiple foci of cellular hyperplasia in the perivascular lymphadenoidal sheath, while in classical plague the tendency toward necrosis with simultaneous exudation in these locations is greater than that which can be observed in atypical fowl plague.

While degenerative-necrotic affection of the liver and kidneys are common to both diseases, a manifestation which as a rule occurs only in cases of atypical plague should be noted. This is the development in the liver of

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cellular proliferative reactions with hyperplasia of the lymphoid tissue, frequently near the walls of the vessels, with subsequent necrosis of the latter, and the presence in the kidneys of proliferative, regenerative phenomena affecting the epithelium of the tubular and the inter-tubular connective tissue. These manifestations were not observed in classical fowl plague.

The affection of the central nervous system, according to our data, has very similar features in both diseases. The only difference is that in classical plague, as a rule, degenerative-necrotic process predominated and proliferative manifestations were weakly expressed. On the other hand, in atypical plague, proliferative manifestations on the side of the endothelium of the vessels were more marked, accompanied by an intensive gliotic reaction which was so marked that it had the character of gliotic foci where the symptoms of necrosis were difficult to detect. The intensity of proliferative reaction increases with the duration of the disease.

It should also be noted that in atypical plague manifestations of encephalitis were noted considerably more frequently than in classical plague (according to our observation, in 60 to 70 percent of the cases investigated), while the percentage of affections of the central nervous system was relatively higher with longer duration of the disease.

In this manner, on the basis of the data obtained in the comparative morphological investigation, it can be concluded that against the background of common symptoms and the common picture of septic disease, classical and atypical fowl plague have differences which regularly occur in both the spontaneous and the experimental forms of the infection.

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